

Engineering And Robotics Learned Young

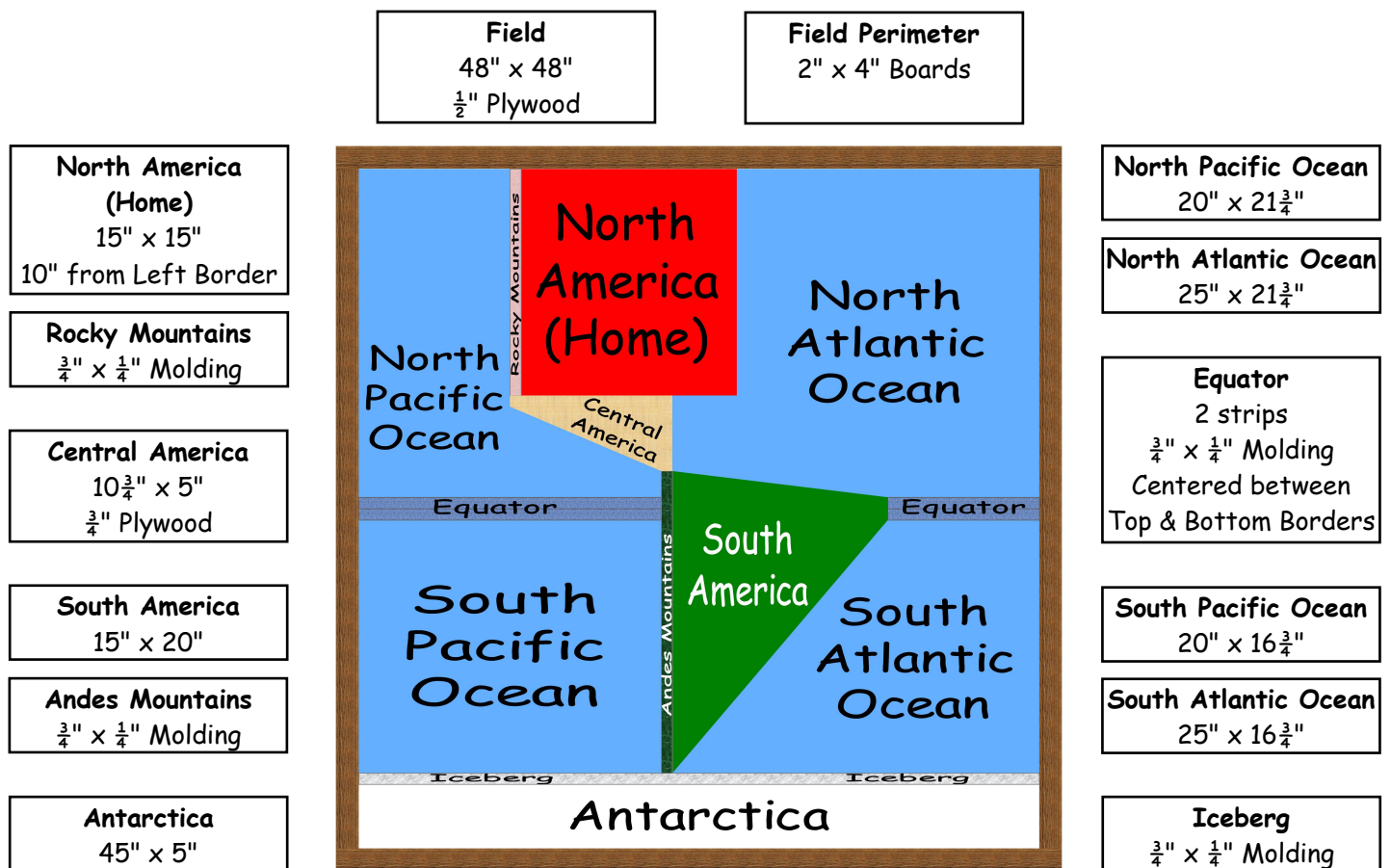
◆ EARLY ◆

Spring 2013 Robotics Competition

Roboticists, thank you for helping the Global Ocean Exploration Scientists, GOES, explore the Atlantic Ocean, which resulted in discoveries that will improve our lives, and keep our oceans, seas, and gulfs much healthier! GOES now needs you to build a robot to deploy SeaBots in the North and South Pacific Oceans. Please help GOES explore the Pacific!

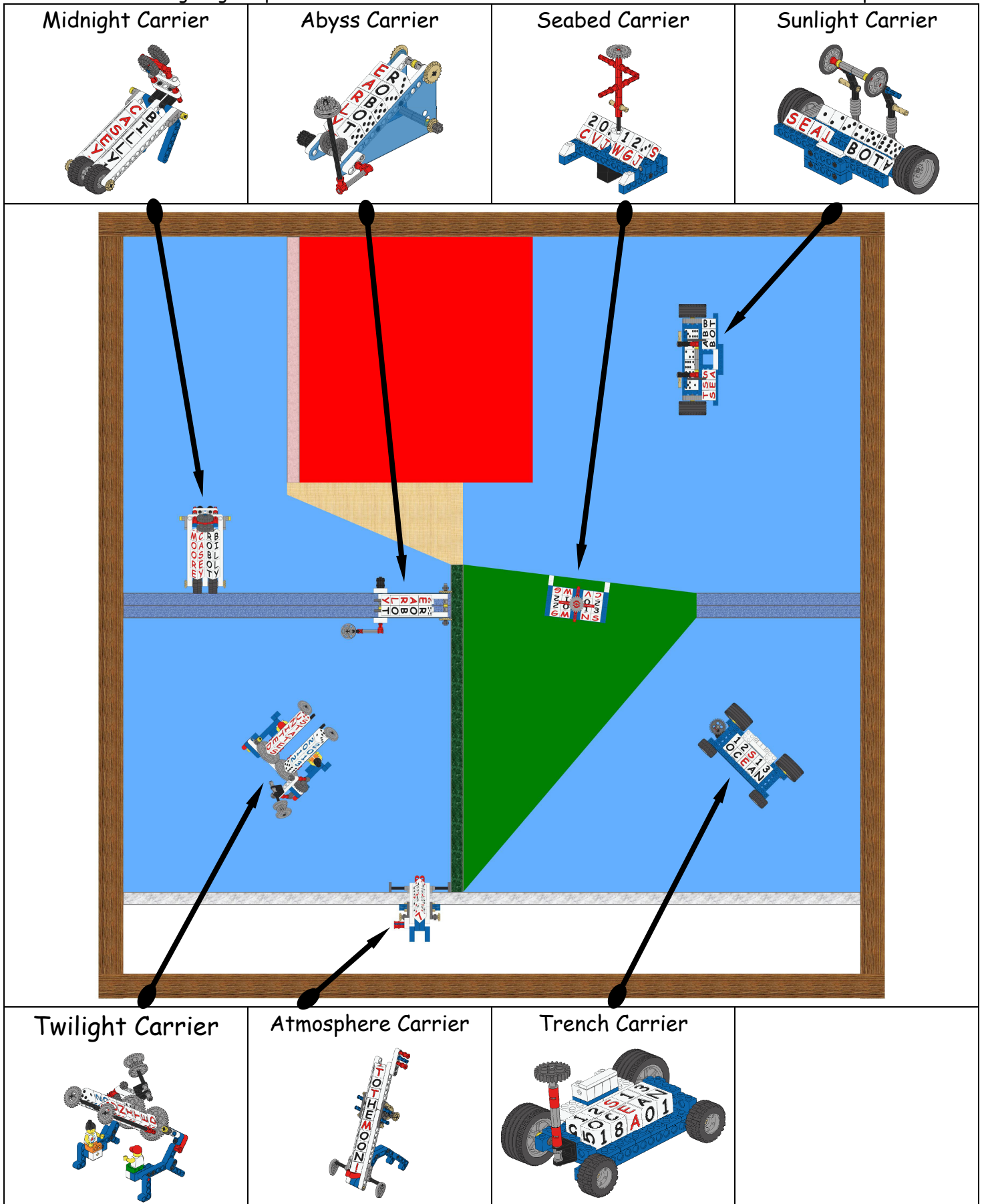
Below is everything that we know about the mission.

- The team must be ready to execute the mission for your EARLY Tournament.
- The equipment available for a team to build a robot is 3 LEGO® Simple & Motorized Mechanisms Kits.
- The following diagram presents the environment that will be encountered. Construction details are found in the *Mission Field Details* document.



Western Hemisphere

- The following diagram presents where the *SeaBots* and *Carriers* will be in the Western Hemisphere.



Mission Rules

1. The team has 2 minutes to complete the mission.
2. There are 76 *SeaBots* on the mission field at the beginning of each mission, represented by dice. Dice details are found in the *Mission Object Details* document.
3. There are 7 *SeaBot Carriers* on the mission field at the beginning of the mission constructed from one LEGO® Simple & Motorized Mechanisms kit. Carrier details are in each *Carrier Instruction* document.
4. The team's score is determined at the end of the 2-minute mission.
5. If a *SeaBot* is moving when time expires, the *SeaBot's* scoring position is determined when the *SeaBot* has come to rest.
6. There are two scoring zones: the **NORTH PACIFIC OCEAN** and **SOUTH PACIFIC OCEAN**.
7. The goal of the mission is to evenly *deploy SeaBots* amongst the **NORTH PACIFIC OCEAN** and **SOUTH PACIFIC OCEAN**.
8. A *SeaBot* is *deployed* when the *SeaBot* is directly supported by the field or other *SeaBots* that are *deployed*. A *SeaBot* is *NOT deployed* if it is on a *Carrier* or in a robot.
9. The team scores 2 points for each *SeaBot* that is deployed in a scoring zone that has a corresponding *SeaBot deployed* in the other scoring zone. Therefore, each of these evenly *deployed SeaBot Pairs* is worth 4 points.
10. The team scores 1 point for each *SeaBot* that is *deployed* in a scoring zone and is not part of a *SeaBot Pair*.
11. There is one penalty zone: **ANTARCTICA**. The **ICEBERG** is part of **ANTARCTICA**.
12. The team is penalized 3 points for each *SeaBot deployed* in **ANTARCTICA**.
13. A perfect score is achieved by having 38 *deployed SeaBots* in each of the two scoring zones. Thereby, all 76 *SeaBots* are part of 38 *SeaBot Pairs* resulting in a score of $76 \times 2 = 152$ or $38 \times 4 = 152$. In contrast, if all 76 *SeaBots* are *deployed* in one scoring zone, the resulting score is $76 \times 1 = 76$.
14. A *SeaBot deployed* and breaking the plane of a scoring zone is considered *deployed* in the scoring zone.
15. A *SeaBot deployed* in multiple zones simultaneously (scoring zone & non-scoring zone, scoring zone & penalty zone, penalty zone & non-scoring zone, etc.) is considered *deployed* in the zone that results in the greatest points.
16. A *SeaBot deployed* on the **PACIFIC EQUATOR** is considered *deployed* in the scoring zone (**NORTH PACIFIC OCEAN** or **SOUTH PACIFIC OCEAN**) that results in the greatest points.
17. Please remember that a *SeaBot* must be "*deployed*" in a scoring zone for a *SeaBot* to count for points. A *SeaBot* is *deployed* when the *SeaBot* is directly supported by the field or other *SeaBots* that are *deployed*.

18. Only the parts that are contained in three LEGO® Simple & Motorized Mechanisms kits along with nine 20" controller extension wires may be used to construct the robot and attachments (i.e. no other materials such as glue may be used on the robot). The kit parts may not be altered.
19. **HOME** is the 15" x 15" boundary extended vertically. The **ROCKY MOUNTAINS** are part of **HOME**.
20. The robot and all attachments must begin completely inside **HOME** at the beginning of the 2-minute mission (i.e. no LEGO parts may be off the playing field when the mission begins). The parts do not have to be assembled together and the parts may be removed from and returned to the field during the 2-minute mission.
21. The team may retrieve their robot without penalty when the robot is partially inside **HOME** by lifting the robot vertically. After retrieving, the robot must be returned to **HOME**. If a *SeaBot* or *Carrier* remains with the robot when the robot is retrieved, the *SeaBot* or *Carrier* shall be removed from play.
22. If a team touches their robot, including parts that have become separated from the robot, that is completely outside **HOME**, a penalty of 10 points shall be assessed. The robot must be returned **HOME** to continue the mission and if a *SeaBot* or *Carrier* remains with the robot when the robot is returned **HOME**, the *SeaBot* or *Carrier* shall be removed from play.
23. The robot must start completely inside **HOME** every time the robot is returned **HOME** (i.e. after retrieving the robot, no part of the robot may be breaking the **HOME** plane when continuing the mission).
24. The controllers and wires are NOT considered part of the robot.
25. The controller wires may only be used to provide electrical power to robot motors (i.e. the controller wires may not be used to drag or corral a robot, *SeaBot* or *Carrier*). If a controller wire is used illegally (referee's judgment), the robot must immediately be returned **HOME** to continue the mission.
26. The robot shall not have any elastic stored energy when the mission begins or when the robot is returned **HOME**, but elastic stored energy may be created with a motor during the mission (i.e. the robot may not be manually "wound up").
27. If a team touches a *SeaBot* or *Carrier* that is partially or completely inside **HOME**, the *SeaBot* or *Carrier* shall be removed from play. If a *Carrier* is touched, the *Carrier*, along with any *SeaBots* on the *Carrier*, shall be removed from play. This is the *EARLY Game Changing Rule* intended to make the Spring Mission more challenging than the Fall Mission.
28. If a team touches a *SeaBot* or *Carrier* that is completely outside of **HOME**, a penalty of 10 points shall be assessed and the *SeaBot* or *Carrier* shall be removed from play. If a *Carrier* is touched, the *Carrier*, along with any *SeaBots* on the *Carrier*, shall be removed from play.
29. A *Carrier* or *Seabot* is never considered part of the robot.
30. Because *SeaBots* are very valuable, if a *SeaBot* is ejected from the playing field, a penalty of 10 points shall be assessed. No penalty shall be assessed for a *SeaBot* that is removed as a result of a mission rule.
31. A score of zero shall be awarded if penalties result in a negative score.
32. All referees' rulings are final.

Please contact Mission.Control@EARLYrobotics.org with any questions or comments.

Thank you for maintaining the spirit of the game!